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REPORT ON A COLLECTION OF EMBIOPTERA FROM TRINIDAD AND GUIANA

By Consett Davis, M.Sc.

(New England University College, Armidale, New South Wales.)

A collection of Embioptera secured by Dr. E. McC. Callan in Trinidad and British Guiana was received for study from Dr. O. W. Richards. Four species are included, representative of four families, of which three are indigenous in the Neotropical Region, the fourth introduced. Two of the species *Clothoda urichi* (Saussure) Davis, *Pararhagadochir trinitatis* (Saussure) Davis have previously been re-described (Davis, 1939c, 1940a) from cotype material (single dried specimens of each species), but the present well-preserved series allows the addition of further details. *Oligotoma saundersii* Westwood, a native of the Indian Region, is now pantropic, spread by human transport. The fourth species is new.

Some of the present series are from colonies from which were bred parasitic wasps (Bethylidae, Sclerogibbinae; Richards, 1939; Callan, 1939). Perusal of the former paper indicates that all localities from which Sclerogibbinae have been recorded are well known as localities for Embioptera. It seems probable that members of this sub-family are exclusively parasitic on Embioptera, the few species which have been bred from known hosts supporting this view (*cf.* also Dodd, 1939).

Clothodidae Tillyard 1937.

Amer. J. Science **33** : 251. (Clothodinae Enderlein 1909, *Zool. Anz.* **35** : 176 : as sub-family of Embiidae.) Type genus, *Clothoda* Enderlein 1909, *loc. cit.*

Neotropical Embioptera, the males winged, R_{4+5} forked (exceptionally simple by aberration in one or more wings), Cu_1 2- to 4-branched; tenth abdominal tergite undivided or, if divided, processes little prominent; ventral parts of terminalia not markedly asymmetrical, and still retaining some similarity to the larval type; cerci symmetrical, each with two long subcylindrical segments, without echinulation.

Both sexes with two bladders on the plantar surface of the first segment of the hind tarsus.

Clothoda Enderlein 1909, *loc. cit.*

Genotype, *Embia nobilis* Gerstaecker 1888, *Mitt. naturw. Ver. Neuvorpommern u. Rügen* **20** : 1. (Synonym : *Antipaluria* Enderlein 1912, *Coll. zool. Selys-Longchamps* **3** : 63; *cf.* Davis, 1939c : 379–380.)

Characters as for the family.

Clothoda urichi (de Saussure 1896) Davis 1939c.

Proc. Linn. Soc. N.S.W. **64** : 377. *Embia urichi* de Saussure 1896, *J. Trinidad Club* **2** : 293.

♂ : Length 10·5–14·0 mm.; general colour dark brown, wings with veins bordered by smoky-brown bands. Head (fig. 1) 2·0–2·6 mm. × 1·5–2·0 mm.; antennae with up to 21 segments, last three cream, maximum total length 8 mm.; mandibles rather stout, terminal and subterminal teeth subobtuse. Fore-wing 8·0–11·7 mm. × 2·0–3·0 mm.;

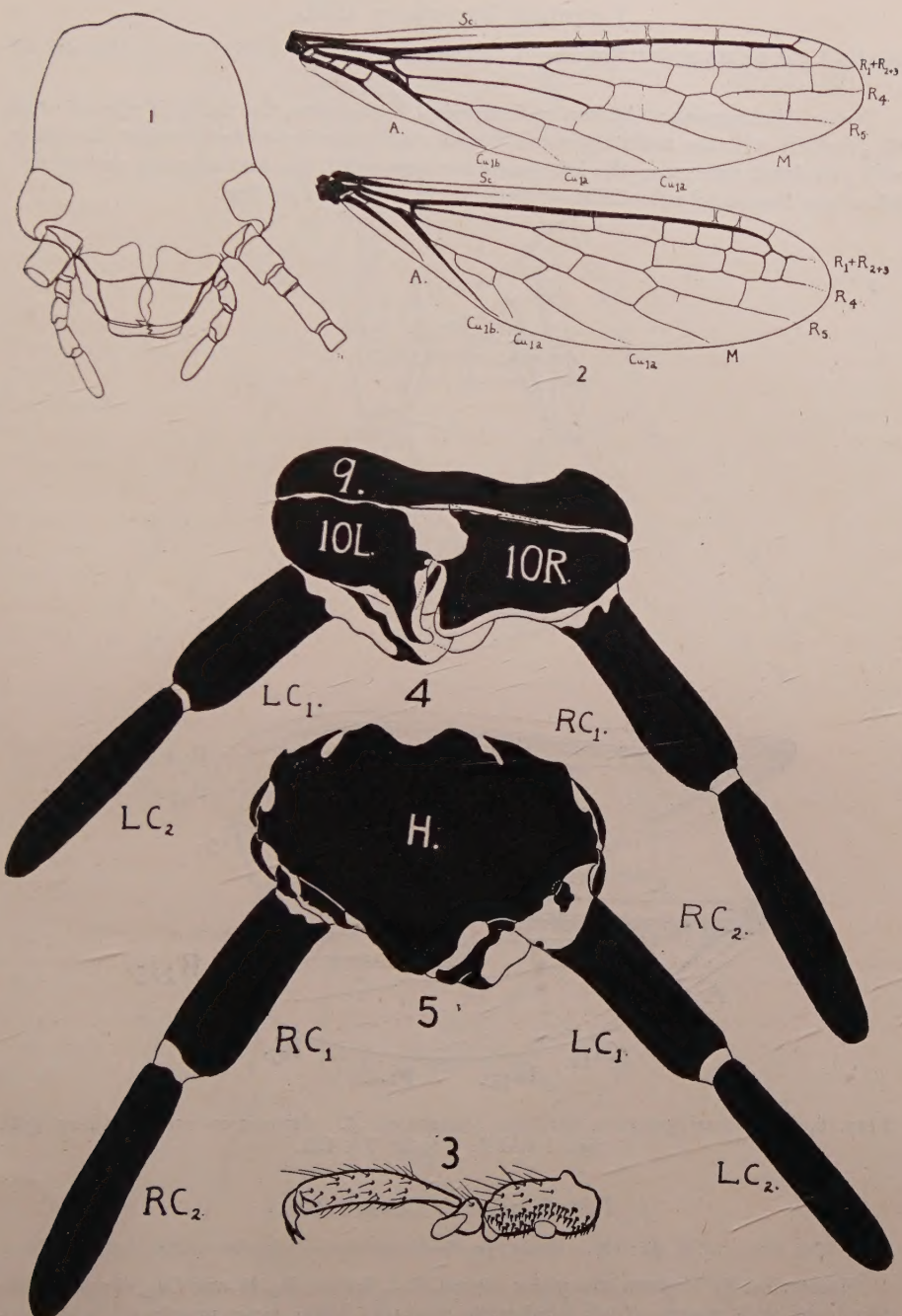
hind-wing 7·0–10·6 mm. × 2·0–3·0 mm. Venation (fig. 2) somewhat variable (*infra*); R_{4+5} forked, rarely simple in some wings; M simple; Cu_{1a} simple or forked; all veins strongly developed, cross-veins variable in number and position but relatively frequent. Hind tarsi (fig. 3) with two bladders on plantar surface of first segment. Terminalia (figs. 4–5) with ninth abdominal tergite transverse and slightly asymmetrical, tenth abdominal tergite separated by a membranous area into right and left hemitergites, the former subtriangular, the angle between its distal and inner margins representing an obtuse process; distal margin of right hemitergite membranous, inner margin irregular, with a small inwardly-directed spur, connecting to an oblique sclerotised rod sunk in membrane. Region between basal parts of hemitergites more or less membranous in most specimens, sometimes irregularly sclerotised. Inner margin of left hemitergite produced back to a blunt process, terminally curved to the right and upwards, membranous along the right-hand side. Cerci symmetrical, two-segmented, both segments smooth, subcylindrical, the basal one thicker. Ninth abdominal sternite (hypandrium) with sclerotised margins irregular; median posterior process blunt. Two sclerites embedded in membranes between hypandrium and base of right cercus, the inner one slightly hooked terminally, the outer one small (as figured) or sometimes transverse and subannular. These sclerites probably represent the larval right cercus-basipodite and right half of the tenth abdominal sternite. On the left of the distal process of the hypandrium is a blunt membranous lobe, with a median sclerotised area expanded distally, and probably representing the left half of the larval tenth sternite. Between this lobe and the left cercus there may be irregular sclerites embedded in membrane (fig. 5), or, more frequently, most of this region may be sclerotised; this region corresponds to the left cercus-basipodite of the larva.

♀: Length up to 16 mm.; general colour as in the male, the intersegmental membranes of the lateral parts of the abdomen more obvious as pale streaks. Wingless and larviform as throughout the Order.

Localities, Trinidad, B.W.I.: Detailed locality not given (de Saussure's types, both sexes, coll. F. W. Urich; Geneva Museum); Port of Spain, coll. Wheeler (1 ♂, 3 ♀; Museum of Comparative Zoology, Harvard University); and the following new records, coll. E. McC. Callan: La Laja, 24.iv.38 (1 ♂, 8 ♀, 11 larvae); Mount St. Benedict, 23.i.38 (2 ♂, 15 larvae); St. Augustine, 18.iii.38 (1 ♂) and 6.i.39 (2 ♂, 20 larvae).

Note: Variability in the branching of the cubitus in Trinidad specimens indicates that *Clothoda intermedia* Davis (1939c : 376; type locality, Caracas, Venezuela) should be reduced to the synonymy of *C. urichi* (Saussure). *C. intermedia* was separated on the 3-branched cubitus, all Trinidad specimens previously seen having two branches only. Amongst the present series, the anterior branch of the cubitus (Cu_{1a}) is forked in all wings in the La Laja specimen; simple in all wings in one Mount St. Benedict specimen, and in the other simple in all except the left fore-wing, where there is a faint trace of an extra branch. Of the three St. Augustine specimens, one has Cu_{1a} forked in the fore-wings, weakly forked in the left hind-wing, simple in the right hind-wing; the second, simple in all wings except the left fore-wing; and the third, simple in all wings, with a weak second anterior branch arising from Cu_{1b} in the right hind-wing.

In view of this variability, even varietal rank cannot be allowed to specimens with a 3-branched cubitus. Should the collection of further extensive series indicate that the cubitus is usually 2-branched in Trinidad specimens, 3-branched in mainland examples, with few exceptions, then the name *intermedia* might be used subspecifically, or perhaps the name *aequicercata* Enderlein might come into use (*cf.* Davis, 1939c : 379).

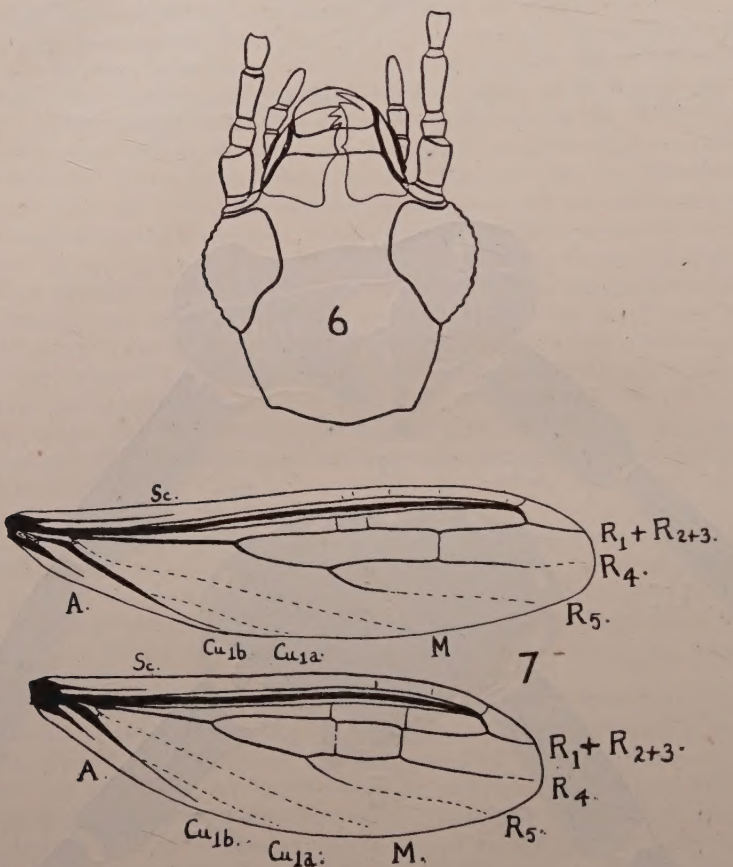


FIGS. 1–5.—*Clothoda urichi* (Saussure), ♂, La Laja, Trinidad: 1, head from above, outline of mandibles indicated, × 16. 2, right fore- and hind-wing, × 6. 3, hind tarsus viewed laterally, × 33. 4, terminalia from above, × 33. 5, terminalia from below, × 33.

Embiidae Burmeister 1839.

Handbuch Ent. **2** : 768 (spelt " Embidae "). Type genus, *Embia* Latreille 1829, *Le Règne animal* (Édit. 2) : 256.

Indian, Mediterranean, African or Neotropical Embioptera, the males (if winged) with R_{4+5} forked; with the tenth abdominal tergite clearly divided to hemitergites, the latter with prominent processes; the left cercus two-segmented, the first segment clavate and echinulate, the second subcylindrical, distinctly sutured from the first.



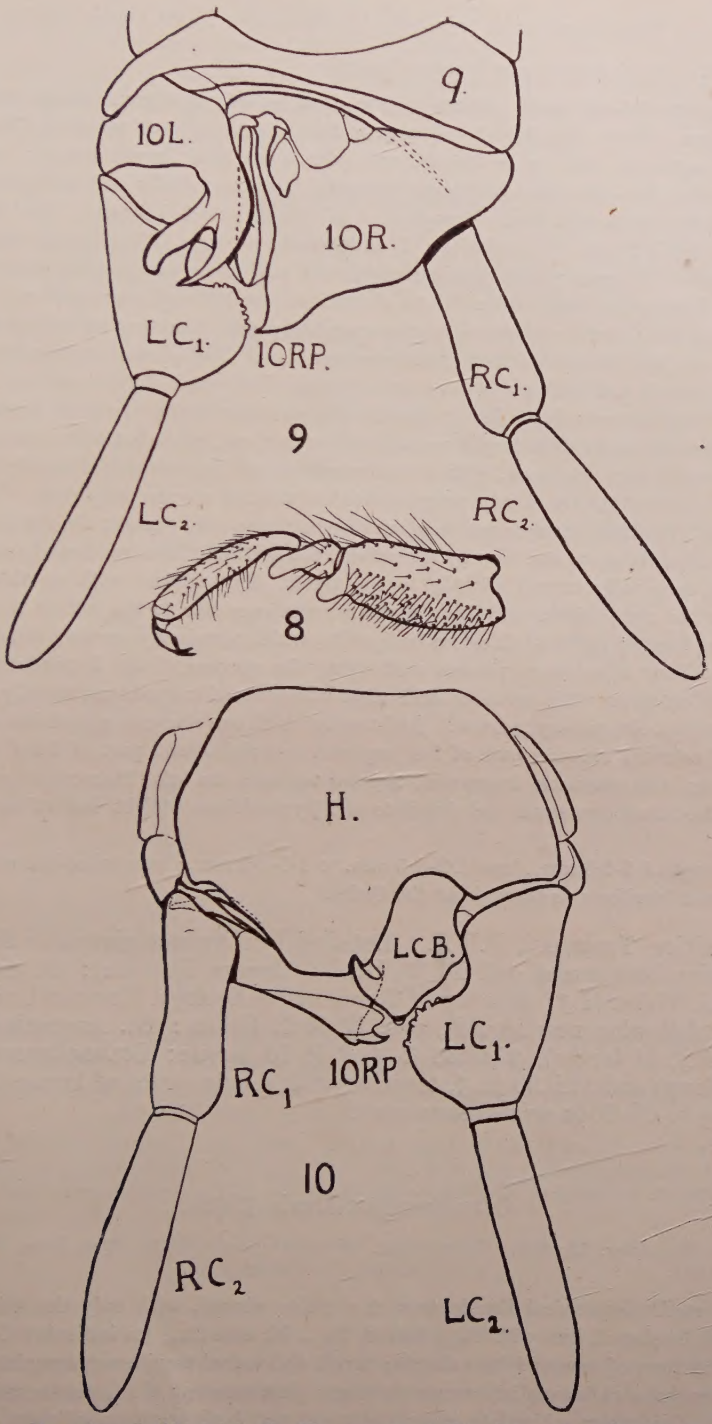
Figs. 6, 7.—*Pararhagadochir trinitatis* (Saussure), ♂. Structures corresponding with figs. 1 and 2; 6 × 33, 7 × 131.

Pararhagadochir Davis 1940a.

Proc. Linn. Soc. N.S.W. **65** : 181. Genotype, *Embia trinitatis* de Saussure 1896, *op. cit.* : 293.

Neotropical Embioptera, the males winged, R_{4+5} forked, R_5, M, and Cu_{1a} simple, weak; terminalia with process of left hemitergite markedly bifid; inner margin of right hemitergite running forward from distal extremity towards ninth abdominal tergite as a sclerotised rod, from near the end of which arises an oblique bar embedded in membrane.

Both sexes: First segment of hind tarsus usually without a medial bladder on the plantar surface.



FIGS. 8–10.—*Pararhagadochir trinitatis* (Saussure), ♂, St. Augustine, Trinidad. Corresponding structures to figs. 3–5 respectively; 8–10, × 70.

Pararhagadochir trinitatis (de Saussure 1896) Davis 1940a.

Op. cit. : 182. *Embia trinitatis* de Saussure, *loc. cit.*

♂ : Length 6·5–8·7 mm.; general colour dark brown, prothorax cream, wing-bands smoky-brown. Head (fig. 6) 1·2–1·4 mm. × 0·9–1·1 mm.; eyes relatively large, subreniform; antennae with up to 23 segments, maximum total length 4 mm.; mandibles rather slender, the left with three acute incurved teeth terminally and subterminally on inner face, the right with two. Fore-wing 5·2–7·0 mm. × 1·3–1·6 mm.; hind-wing 4·8–5·9 mm. × 1·3–1·7 mm. Venation (fig. 7) as throughout genus. Hind tarsus (fig. 8) with plantar surface of first segment evenly clothed with stiff setae, except for a small terminal bladder. Terminalia (figs. 9–10): Ninth abdominal tergite short, asymmetrical, narrower on left-hand side; tenth abdominal tergite completely cleft, hemitergites widely separated by membrane but joined by a thin transverse basal bar. Right hemitergite subtriangular, produced inwards and backwards to an acute process, below and slightly anterior to which is a blunt membranous flap. Inner margin of right hemitergite produced forward from distal process almost to ninth tergite as a thin sclerotised rod, hooked at end; a membranous flap is attached near this hook, with a median sclerotised bar running obliquely back and to the left and terminally closely approximated to the left cercus-basipodite. Left hemitergite small, produced inwards and then curving back as a bifid process, the right-hand lobe curved to the left, acute and heavily sclerotised, the left-hand lobe less heavily sclerotised, subobtuse, terminally curved slightly to the right. Hypandrium with an obtuse distal process to the right of the mid-line; distal margin excavate to the left of this process, excavation filled by the flat left cercus-basipodite, which terminally curves to the right and forward to form a subacute process underlying the process of the hypandrium. First segment of left cercus with a rounded echinulate lobe directed inwards and slightly forwards; second segment elongate-cylindrical. Right cercus with two elongate cylindrical segments; two small sclerites between base of first segment and right-hand part of distal margin of hypandrium, the outer one transverse, tapered towards the left (?true right cercus-basipodite), the inner one small and fused to the hypandrium (?right half of larval tenth sternite).

♀: Length 6·5–9·8 mm., head 1·2–1·5 mm. × 1·0–1·5 mm.; general colour as in the ♂; wingless and larviform as throughout the Order.

Localities, Trinidad, B.W.I.: Detailed locality not given (de Saussure's type series, both sexes, coll. F. W. Urich; Geneva Museum); St. Augustine, coll. N. A. Weber (1 ♂; Museum of Comparative Zoology, Harvard University); and the following new records, coll. E. McC. Callan: St. Augustine, 17.i.38 (2 ♂, 12 ♀, 24 larvae), 25.iii.38 (3 ♂, 7 ♀, 10 larvae; Sclerogibbinae bred from colony) and 19.ii.39 (1 ♂, together with a long series of larvae belonging probably to *Clothoda urichi* (Saussure)).

Oligembiidae Davis 1940b.

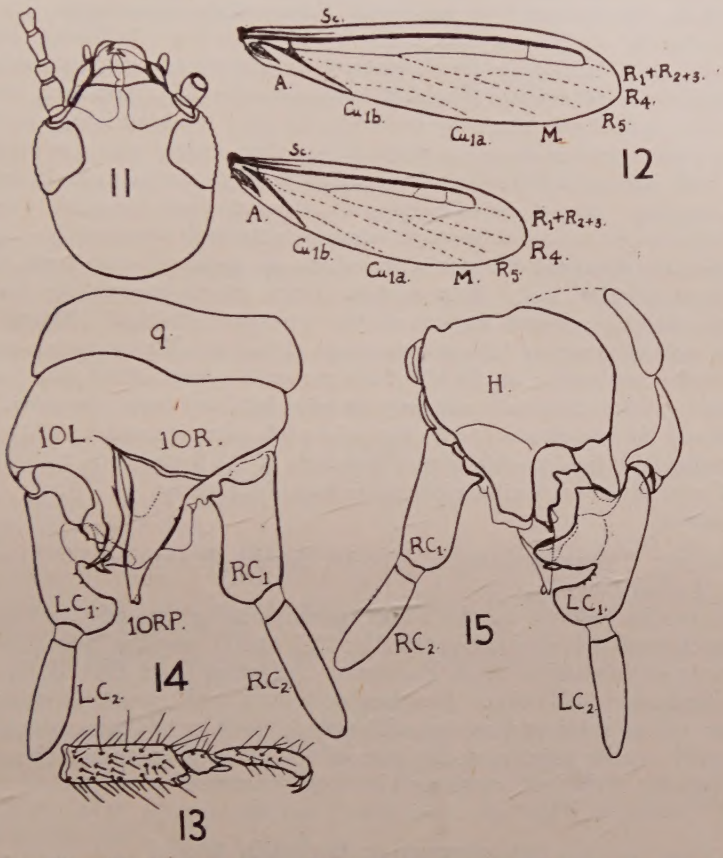
Ann. ent. Soc. Amer. **33** : 680. Type genus, *Oligembia* Davis 1939b, *Proc. Linn. Soc. N.S.W.* **64** : 217.

Very small Neotropical Embioptera, the males winged, with only the veins R_1 and Cu_{1b} well developed, but with R_{4+5} forked, R_{2+3}, M, and Cu_{1a} (as indicated by pigment-bands and rows of macrotrichia) simple; tenth abdominal tergite not completely cleft to base; structures at base of left cercus complex; first segment of left cercus subcylindrical to clavate, but never echinulate, second segment and both segments of right cercus subcylindrical.

Oligembia Davis 1939b.

Loc. cit. Genotype, *Oligotoma hubbardi* Hagen 1885, *Canad. Ent.* 17 : 142.

OLIGEMBIIDAE with the process of the left hemitergite of the male terminalia complex, and the base of the left cercus having an inner lobe affixed. First segment of hind tarsus without medial ventral bladder, terminal bladder small or wanting.



FIGS. 11–15.—*Oligembia intricata* sp. n., holotype ♂; corresponding structures and magnifications to figs. 6–10 respectively.

(Setae omitted except in figures of tarsi. All figures based on camera lucida outlines, or prepared with a projection drawing-apparatus.

9, ninth abdominal tergite; 10L, 10R, left and right hemitergites of tenth abdominal tergite; H, hypandrium; LC_1, LC_2, RC_1, RC_2, first and second segments of left and right cerci respectively; LCB, structure conventionally referred to as left cercus-basipodite; 10RP, posterior process of 10R.)

Oligembia intricata sp. n.

♂: Length 5·0 mm; general colour dark brown, eyes black, wing-bands pale brown. Head (fig. 11) 1·0 mm. × 0·8 mm., eyes not prominent, head outline behind eyes semicircular; antennae incomplete; mandibles with outer margin irregular, inner margin with a blunt median tooth, and acute terminal and subterminal teeth, the left with three, the right two. Fore-wing 4·0 mm. × 0·9 mm., hind-wing 3·2 mm. × 0·9 mm.; venation (fig. 12) as throughout genus. Hind tarsus (fig. 13) with first segment slender, cylindrical,

with a minute terminal ventral bladder sunk in a recess of the sclerite of the segment; setae not numerous. Terminalia (figs. 14–15) very complex; tenth abdominal tergite only slightly divided by an oblique cleft running forward and to the left from the mid-point of its distal margin; right-hand part produced back to a narrow, evenly-tapered process, whose sclerotisation is not basally continuous with the hemitergite; margins of process slightly crenulate, termination subobtuse, with a minute subglobular lobe subterminally on the right and extending just beyond the end of the main process. Inner margin of process basally overlying a small obtuse membranous flap. Left-hand extremity of distal margin of left hemitergite curved back and to the right as a rounded condyle for the articulation of the left cercus. Process of left hemitergite bifid, right-hand lobe slender, acute, heavily sclerotised, terminally curved to the left; left-hand lobe more ventral in origin, flat, spathulate, more or less membranous, distal margin with a subacute median tooth. First segment of left cercus obtusely clavate, inner margin medially concave and slightly crenulate; base of cercus carrying an intimately-fused inner lobe (?left cercus-basipodite), obtusely tapered at free (right-hand) end; half-way along this lobe is an oblique dorsal ridge, the distal end of which is formed into an up-curved acute tooth, the middle region into a spherical knob. First segment of right cercus very weakly clavate, basal articulation irregular; second segment of each cercus subcylindrical. Hypandrium subquadrate, right-hand part of distal margin produced back as a tapered tongue-like process, weakly bilobed terminally; on the left of this process is a longitudinal plate (?left half of larval tenth sternite), terminally obliquely truncate, left-hand margin irregular. Between this plate and the lobe attached to the base of the left cercus is another weakly-sclerotised lobe, running back from the left latero-distal angle of the hypandrium to terminate in a rounded extremity above the inner lobe at the base of the cercus.

♀ unknown.

Locality: "British Guiana, Mile 18, Bartica–Potaro road," 10.iv.38, coll. E. McC. Callan (holotype ♂).

This species belongs to the series, perhaps subgenerically distinct, which includes *Oligembia banksi* Davis (1939b : 221) and *O. pacifica* Ross (1940 : 640); the former was described from Paraguay, the latter from Tres Marias Islands, off the west coast of Mexico. It agrees with both in the generic structure of the processes of the hemitergites, but differs from both in the presence of only one acute tooth on the process at the base of the left cercus, and in the outline of the remainder of the left cercus and its basal sclerites.

Oligotomidae Enderlein 1909.

Op. cit. : 190. Type genus, *Oligotoma* Westwood 1837, *Trans. Linn. Soc. Lond., Zool.* **17** : 373.

Embioptera indigenous in the Oriental, Australian and Mediterranean Regions, the male terminalia having the tenth abdominal tergite incompletely cleft, the hemitergites being in contact basally; the outer of the right hemitergite produced back as a long thin sclerotised process, which basally overlies an obtuse medial flap, the latter having a medial sclerotisation continuous with that of the outer process; left hemitergite with a prominent process; left cercus with first segment subcylindrical to clavate but never echinulate. Wings, when present, with R_{4+5}, M, and Cu_{1a} simple and very weakly developed.

Oligotoma Westwood 1837.

Loc. cit. as subgenus of *Embia* Latreille 1829. Raised to generic rank, Burmeister 1839, *loc. cit.*. Genotype, *Oligotoma saundersii* Westwood 1837, *loc. cit.*

Oriental or Australian Oligotomidae (now pantropic, spread by human transport), the first segment of the hind tarsus in both sexes without a median ventral bladder.

Oligotoma saundersii Westwood 1837, *loc. cit.*

This pantropic species, indigenous in the Indian Region, has been redescribed from the type, and its distribution and extensive synonymy discussed (Davis, 1939a). The male terminalia are easily distinguishable from those of all other species by the presence of a curved spine, which arises subterminally from the left-hand margin of the hypandrium, and curves under the hypandrium to the right and, terminally, upwards beside the right-hand margin of the hypandrium.

Additional Localities : Trinidad, B.W.I. : St. Augustine, 19.iii.38, E. McC. Callan (1 ♂, 2 ♀, 3 larvae). British Guiana : Coverden, Demerara River, 15.iv.38, E. McC. Callan (1 ♂, 4 larvae).

Note : From the series recorded above, the following have been placed in the Macleay Museum, Sydney University : *Clothoda urichi* (Saussure), ♂, ♀, La Laja, Trinidad; ♂, Mount St. Benedict, Trinidad. *Pararhagadochir trinitatis* (Saussure), ♂, ♀, St. Augustine, Trinidad.

The remainder are being returned to Dr. O. W. Richards, representative specimens, including the holotype of *Oligembia intricata*, to be deposited in the British Museum (Natural History). Owing to war conditions, these specimens have been placed for temporary safe-keeping in the Australian Museum, Sydney.

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THE RACES AND FORMS OF *MAHATHALA AMERIA* (HEWITSON) LEP. RHOP.

By G. Talbot, F.R.E.S.

(With One Text-figure.)

The genus *Mahathala* Moore is, apparently, a monotypical one. The forms of *ameria* Hewitson appear to be separated geographically, and in the structure of the ♂ genitalia no obvious differences are found. The distinct forms represented by *angulata* (Leech), *ameria* (Hewitson), and *zistra* Fruhstorfer were dissected.

When examining the type of *zistra*, to confirm the sex, I became doubtful, although the insect was described as a female and resembled one in facies. Dissection proved it to be a male and the existence of two species appeared possible. However, on the available data and genitalia comparisons, I conclude that only one species exists. More information is desirable as to the true range of the subspecies *ameria* (Hewitson).

To determine the sexes without dissection the fore tarsus should be examined and compared with the accompanying figures, kindly prepared by Dr. A. S. Corbet. The male tarsus is composed of a single segment furnished with a number of bristles; the distal extremity is rounded. The female tarsus is fully developed with five segments; the terminal segment is furnished with two well-developed claws; all the segments bear numerous bristles.

M. ameria (Hewitson) is known from China, Formosa, Hainan, Yunnan, Assam, Eastern Bengal, Burma, Siam, Malaya, Sumatra, Java.

Eight subspecies are distinguished of which two, including a form, are herein described as new. They are enumerated below and a key to their identification is appended.

All the material dealt with in this paper is in the British Museum (Natural History), and I am grateful to the Trustees for enabling me to study it.

(1) *Mahathala ameria angulata* (Leech).

Amblypodia angulata Leech, 1890, *Entomologist* **23** : 44 (♀, Changyang).

Habitat.—Western and Central China. Holotype ♀ in British Museum from Changyang, also 1 ♂, 1 ♀ from Moupin.

(2) *Mahathala ameria gone* Druce.

Mahathala gone H. H. Druce, 1895, *Proc. zool. Soc. Lond.* **1895** : 593 (Mongolia).

This subspecies is nearest to *angulata* (Leech). It is represented in the British Museum only by the unique type, a ♀.

Habitat.—Mongolia, 1 ♀.

(3) **Mahathala ameria kiangana** subsp. n.

♂. *Upperside* of fore-wing with black border slightly wider than in the Burmese subspecies, and less so than in *angulata*. Hind-wing border as on fore-wing but widened posteriorly, though less wide than in *angulata*; the blue colour extends into area 6 in a thin streak, and below vein 2 only reaches the fold in area 1*c*.

Underside with grey markings more sharply defined than in the Burmese subspecies. Hind-wing without a distinctly defined basal darker brown area.

♀. *Upperside* blue areas much reduced and duller compared with the Burmese subspecies. Fore-wing blue usually not extended into area 4, and hind-wing blue only extended slightly beyond the cell.

Underside as in the ♂.

Habitat.—China: Kiang-Si (*C. Bock*, 1894), 2 ♂♂, 6 ♀♀ (ex Coll. Oberthür) (types); Ku Shan, 2.xi.1886, 1 ♂; Foochow (*de la Touche*), 1 ♂, 1 ♀; Assam: Dausin Valley, vi.1889 (*Doherty*), 1 ♀; Bengal: Chittagong, 3.viii.1890 (*H. M. Parish*), 1 ♀.

Mahathala ameria kiangana f. **umbrina** form. n.

♂. *Upperside* as in *kiangana*. *Underside* as in the subspecies from Lower Burma, with contrasting grey markings.

♀. *Upperside* of fore-wing with blue area extended slightly into areas 4 and 5. Hind-wing blue slightly more extended than in *kiangana*, but to a much less extent than in the Burmese subspecies.

Underside similar to the ♂. In two specimens from Maymyo the hind-wing bands are strongly marked as in *kiangana*, but are more grey.

Habitat.—Assam: Nichuguard, v.1914 (ex Coll. Tytler), 2 ♀♀. Burma: Upper Shan States, Maymyo, July and September (ex Coll. Tytler), 3 ♂♂, 2 ♀♀ (types); "Burma," 1 ♀.

(4) *Mahathala ameria hainani* Bethune-Baker.

Mahathala hainani Bethune-Baker, 1903, *Trans. zool. Soc. Lond.* **17** : 23, pl. i, fig. 1 (♀) (Hainan, 2 ♀♀).
Mahathala ameria formosa Fruhstorfer, 1908, *Ent. Z.* **22** : 49 (Formosa, Kanshirei, 1 ♀).

Habitat.—Formosa, 3 ♂♂, 7 ♀♀, with holotype ♀ of *formosa*. Hainan, 1 ♂, 4 ♀♀. Yunnan: Teng-Yueh-Ting, 2 ♂♂, 4 ♀♀.

(5) *Mahathala ameria ameria* (Hewitson).

Amblypodia ameria Hewitson, 1862, *Cat. Lyc. Brit. Mus.* : 14, pl. viii, figs. 85, 86 (♀, *non* ♂) (N. India, Siam).
Mahathala ameria Swinhoe, 1911, *in* Moore, *Lep. Indica* **8** : 141, pl. 671, fig. 3a (♂, *non* ♀) (Calcutta).
Mahathala ameria zistra Fruhstorfer, 1908, *Ent. Z.* **22** : 49 (Siam, Muok-Lek, 1000 feet, January, 1 ♂, *non* ♀).

A close comparison of Hewitson's type (a ♀) with all specimens of the comparatively large series of *ameria* now assembled in the British Museum, shows it to agree, and to be almost identical, with a female established as belonging to *zistra* Fruhstorfer.

Habitat.—Eastern Bengal; Siam.

♂ neallotype, the specimen figured by Swinhoe (1911), now in the British Museum. ♀ holotype, "India"; "India," 1 ♂ (ex Coll. Joicey), 1 ♂ (ex Coll.

Boisduval); Calcutta, 1 ♂ (ex Coll. W. H. Evans), 1 ♀ (ex Coll. Elwes); Tippera (*Comilla*), E. Bengal, 1 ♂ (*H. M. Parish*); holotype ♂ of *zistra* Fruhstorfer, Siam.

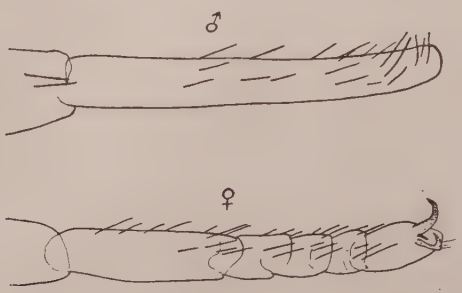

Fig. 1.—*Mahathala ameria ariadeva* Fruhstorfer, tarsus of fore leg, ♂♀.

(6) **Mahathala ameria burmana** subsp. n.

♂. *Upperside* of fore-wing with marginal dark border narrow, not over 1 mm. wide. Hind-wing blue area extending well into area 6, and posteriorly reaching vein 1*a*.

Underside of hind-wing with ground-colour usually much darker than in the nomino-typical subspecies, the dark grey bands usually contrasting strongly; a well-defined basal darker brown area; post-discal band, crossing the distal brownish-grey area, narrow, greyish-black, and usually obscure; submarginal lunulate line obsolete or obscure.

♀. *Upperside* with extensive blue area, much brighter than in the ♂; fore-wing blue extending well into area 4 and usually into 5; black border below vein 4 about 3 mm. wide, the hind-wing border being of similar width.

Underside as in ♂.

Habitat.—Middle to southern Burma: Karen Hills, Ataran, Pegu, Tavoy, etc., a series of both sexes. Western Siam, 6 ♂♂; "Siam," 1 ♀ (paratype of *ameria*, ex Coll. Hewitson).

Types (♂♀): Ataran, Haungthraw Valley, December, 1924 (♂), January, 1925 (♀) (ex Coll. W. H. Evans).

(7) *Mahathala ameria ariadeva* Fruhst.

Mahathala ameria ariadeva Fruhstorfer, 1908, *Ent. Z.* **22** : 49 (= *ameria* Distant, *Rhop. Malay*: 268–269, pl. xxxi, fig. 30, ♀, Perak).

Habitat.—Malaya; Sumatra. A series of both sexes, including the ♀ which appears to have served for Distant's figure (*loc. cit.*) and is therefore the holotype. ♂ neallotype, here selected, from Perak, July and August, 1895 (ex Coll. Oberthür), being specimen dissected (slide no. 7).

(8) *Mahathala ameria javana* Fruhst.

Mahathala ameria javana Fruhstorfer, 1908, *Ent. Z.* **22** : 49 (East Java, 1 ♂, 8 ♀♀).
Mahathala ameria Piepers & Snellen (*non* Hew.), 1918, *Rhop. Java* : 67, pl. xxiii, figs. 95a, b (♂♀, East Java).

Allied to *ariadeva* Fruhst. The blue colour of the ♀ is much brighter than in other forms.

Habitat.—Eastern Java, 1 ♂, 6 ♀♀, including the types. The ♂ appears to be very rare.

Key to subspecies of *Mahathala ameria* (Hewitson).

Males.

1. Fore-wing strongly incurved below apex. Underside of hind-wing with basal black spots in area 1*c* . . . . . *angulata* (Leech).
   Fore-wing not strongly incurved below apex. Underside of hind-wing without basal black spots in area 1*c* . . . . . 2.
2. Upperside of fore-wing marginal dark border at vein 3 less than 1 mm. to 1·5 mm. wide . . . . . 3.
   Upperside of fore-wing marginal dark border at vein 3 from 3 to 6 mm. wide 6.
3. Underside of hind-wing without a submarginal black lunulate line or row of defined spots . . . . . 4.
   Underside of hind-wing with a submarginal black lunulate line or with a row of distinctly-defined black spots . . . . . 5.
4. Underside of hind-wing without a defined basal dark area; darker bands sharply defined . . . . . *kiangana* Talbot.
   Underside of hind-wing with basal darker area; dark grey bands strongly contrasted . . . . . *burmana* Talbot.
5. Underside of hind-wing without a distal grey border; pale bands sharply defined . . . . . *ariadeva* Fruhstorfer.
   Underside of hind-wing with distal broad grey border; the post-discal dark band well defined . . . . . *javana* Fruhstorfer.
6. Upperside of fore-wing marginal black border at vein 3 6 mm. wide. Underside of hind-wing without light mottlings, often leaden grey in distal area . . . . . *hainani* Bethune-Baker.
   Upperside of fore-wing marginal black border at vein 3 3 mm. wide. Underside of hind-wing not mottled; a post-discal narrow grey band about 1·5 mm. wide; a submarginal pale band, about 2 mm. wide, defined by scattered black scaling . . . . . *ameria* (Hewitson).

Females.

1. Fore-wing strongly incurved below apex. Underside of hind-wing with basal black spots in area 1*c* . . . . . 2.
   Fore-wing not strongly incurved below apex. Underside hind-wing without basal black spots in area 1*c* . . . . . 3.
2. Upperside hind-wing blue area faint, extending very slightly beyond cell and neither above nor below it . . . . . *angulata* (Leech).
   Upperside hind-wing blue area extending to about 4 mm. beyond cell and well into areas 2 and 3 . . . . . *gone* Druce.
3. Upperside fore-wing blue not extending into areas 4 or 5 . . . . . 4.
   Upperside fore-wing blue extending into areas 4 or 5 . . . . . 5.
4. Underside hind-wing with distinct submarginal grey spots . *kiangana* Talbot.
   Underside hind-wing very dark, without light submarginal spots *hainani* Bethune-Baker.
5. Upperside hind-wing blue to from 3 to 5·5 mm. beyond cell . . . . . 6.
   Upperside hind-wing blue to from 6 to 7·5 mm. beyond cell . . . . . 7.
6. Upperside fore-wing bright blue. Hind-wing blue to 5 or 5·5 mm. beyond cell . . . . . *burmana* Talbot.
   Upperside hind-wing blue to 3 mm. beyond cell . . . *ameria* (Hewitson).
7. Upperside hind-wing blue to 7 or 7·5 mm. beyond cell. *ariadeva* Fruhstorfer.
   Upperside hind-wing blue to about 6 mm. beyond cell. Fore-wing blue very bright. Underside hind-wing a distal broad grey area and dark basal half . . . . . *javana* Fruhstorfer.

A KEY TO THE SPECIES OF *CYPHICERINUS* MARSHALL

By Sir Guy A. K. Marshall, K.C.M.G., F.R.S.

When this Curculionid genus was described in 1928 (*Ann. Mag. nat. Hist.* (10) **2** : 538, f. 1) it comprised only four species; now nine species are known, three new ones being described below. They form a homogeneous group, dull in colouring and of very similar facies. Nothing is known of the habits beyond the fact that *tectonae* Marshall has been recorded as defoliating teak trees in the Central Provinces, India, and *venalis* Faust has been found in some numbers feeding on the leaves of *Cordia myxa* in Burma. The genus ranges throughout India to Burma and also occurs in the Andamans, but not in Ceylon. An isolated species is known from the Philippines, but although fairly large collections have been examined from Malaya and Indo-China, the genus has not so far been found in those territories, though it probably occurs there. In describing his species *nepalensis* and *appendicinus*, which he placed in the genus *Cyphicerus* Schönherr, Faust stated that they were closely allied to the Japanese *Canoixus japonicus* Roelofs, and sank the genus *Canoixus* as a synonym of *Cyphicerus*. Actually, the two genera are quite distinct, *Canoixus* having the rostrum very differently constructed, and it cannot even be retained in the Eremninae because it has multisetose mandibles, whereas all the Eremnines have trisetose mandibles (see 1942, *Ann. Mag. nat. Hist.* (11) **9** : 2). The types of the new species are deposited in the British Museum.

Key to the species of *Cyphicerinus*.

1(16). Elytra without tubercles, shoulders not projecting laterally; disk of pronotum coarsely punctate; joint 2 of antennal club transverse, or at most as long as broad.

2 (3). Rostrum with a median carina anteriorly which becomes converted behind into a stria that ascends the forehead and merges into the frontal fovea (Central Provinces, Bihar and Madras Pres.) *tectonae* Marshall.

3 (2). Base of rostrum without any continuous median stria, frontal fovea isolated or absent.

4(13). Elytra with intervals of even height and without a posterior callus.

5(10). Dorsal area of rostrum with two carinae on each side (the outer one sometimes indistinct) and immediately adjoining the external one a parallel longitudinal sulcus running straight to upper half of eye.

6 (9). Scape with sparser suberect setae; dorsal area of rostrum with a median carina and not concave at base.

7 (8). Intervals on elytra with more numerous irregular setae, scales narrow; dorsal area of rostrum flat; prothorax of equal width at base and apex; elytra of ♀ without an apical process (Bihar, Madras Pres.) . . . . . *hirsutus* Desbrochers.

8 (7). Intervals on elytra with a single row of setae, scales broadly ovate or nearly round; dorsal area of rostrum depressed in front; prothorax narrower at base than at apex; elytra of ♀ with a short sharp apical process (Philippines) . . . . . *appendicinus* Faust.

9 (6). Scape with denser subrecumbent setae; dorsal area of rostrum concave throughout, without any median carina but only a very shallow median stria; elytra of ♀ with a short sharp apical process (Bombay Pres.) . . . . . *simus* sp. n.

10 (5). Dorsal area of rostrum with only a single carina on each side, the lateral sulcus oblique and directed towards lower half of eye; setae on scape subrecumbent, those on elytra numerous, irregular and very short.

11(12). Rostrum with dorsal area shallowly impressed in front, setae erect; forehead flat transversely; scales on elytra narrow (Burma) *venalis* Faust.

12(11). Rostrum with dorsal area deeply impressed in front, setae recumbent; forehead convex; scales on elytra almost round (Andamans) *andamanicus* sp. n.

13 (4). Elytra with intervals 3 and 5 more raised in parts, with a posterior callus.

14(15). Rostrum not striolate dorsally; forehead with a distinct median fovea; scape with stiff erect setae; elytra without an oblique sub-basal depression (Nepal, Sikkim, Bihar, Assam) . . . *nepalensis* Faust.

15(14). Rostrum striolate; forehead without any fovea; scape with subrecumbent setae; elytra with an oblique depression from near shoulder to suture at one-fourth from base (Burma) . *undulans* Marshall, 1941.

16 (1). Elytra with numerous small tubercles, shoulders projecting laterally; joint 2 of antennal club longer than broad, especially in ♂ (3 : 2); disk of pronotum granulate (Bombay) . . . . . *lesnei* sp. n.

Cyphicerinus simus sp. n.

♀. Derm piceous black, with dark brown scales and vague markings formed of paler yellowish scales, sometimes with a coppery reflection; pronotum with a broad indefinite median stripe of rather sparse coppery scales; elytra with sparse spots of pale scales, some of which form an indefinite band at one-fourth from base and a broader one behind middle.

Head flattened transversely between the eyes, with obsolescent punctures and sparse coppery scales, the frontal fovea round and deep. *Rostrum* a little shorter than its width at the genae (8 : 9); dorsal area broadly concave throughout, without any median carina but only a very shallow abbreviated stria, its lateral margins bounded by a sharp carina, closely adjoining which externally is a lower obtuse carina, and beyond this a parallel deep sulcus running straight to the upper half of the eye, the transverse ridge behind the epistome well marked and not interrupted. *Antennae* with dense recumbent setae on the scape, the two basal joints of the funicle equal. *Prothorax* of equal width at base and apex, almost parallel-sided, only very slightly rounded laterally in the middle, postocular lobes strongly developed and without vibrissae; dorsum with dense rugose punctures and a round post-median impression on each side; setae recumbent. *Scutellum* with dense narrow coppery scales. *Elytra* with rounded rectangular shoulders, widest behind the middle, each with a short sharp apical process in ♀; striae with large round punctures to beyond the middle, the intervals of equal height, about as wide as the striae dorsally, with sparse small irregular granules, each bearing a recumbent spatulate seta.

Length 5·0 mm., breadth 2·5 mm.

BENGAL: Chapra, 1 ♀ (*Mackenzie*).

Distinguished from all its congeners by the entirely concave dorsal area of the rostrum, which has no median carina. The only other species that has an apical process on the elytra in the ♀ is *appendicinus* Faust, from the Philippines, which may be distinguished by the prothorax being narrower at the base than at the apex, and by the intervals of the elytra having only a single row of erect setae.

Cyphicerinus andamanicus sp. n.

♂♀. Derm piceous black or brown, with rather thin greyish-white scaling; prothorax with a narrow pale median stripe; elytra with thin pale scaling on the basal third, followed by a broad subdenuded area, and then a distinct transverse band at the top of the declivity of dense pale scales, its posterior margin being more or less sinuate on each elytron, and the apical area with indefinite pale markings.

Head rather strongly convex transversely between the eyes, shagreened, impunctate, with a deep round median fovea. *Rostrum* as long as its basal width, narrowing rapidly in

front, the re-entrant angle behind the genae being rather sharper than in its congeners and forming almost a right angle; the dorsal area convex at the base but deeply impressed in front, with a low median carina (sometimes evanescent or obsolete), the parallel lateral margins with a single carina, the anterior transverse ridge indefinite, being interrupted in the middle by a fovea; the lateral areas with a short deep curved sulcus directed towards the lower half of the eye and sometimes one or two striae above it. *Antennae* with the scape very stout and with recumbent setae; funicle with joint 2 longer than 1, 7 not or but slightly longer than 6. *Prothorax* moderately rounded laterally, widest at about the middle, postocular lobes well developed and with short vibrissae; dorsum with close deep punctures, the two postmedian impressions round and deep. *Scutellum* with fairly dense narrow pale scales. *Elytra* with roundly rectangular shoulders, parallel-sided in ♂, wider behind middle in ♀, with broad striae containing deep round punctures; intervals convex, of equal height, not narrower than the striae, with irregular minute granules bearing short recumbent scale-like setae; the pale scales almost round.

Length 4·5–6·0 mm., breadth 2·2–3·0 mm.

Andaman Is.: 10 ♂, 12 ♀ (*Capt. Wimberley, Roepstorff*).

The bisinuate postmedian pale band on the elytra is rather characteristic of this species, which is nearly allied to *nepalensis* Faust; but the latter differs in having the forehead almost flat and with shallow punctures; the rostrum has no trace of a median carina, but usually a shallow stria, the genae are less dilated and the angle behind them wider; the scape bears erect setae; and intervals 3 and 5 on the elytra are more raised.

Cyphicerinus lesnei sp. n.

♂♀. Derm black, with rather sparse, light brown or yellowish scaling, the elytra with a very indefinite paler band at one-fourth from base and another more distinct one across the top of the declivity reaching to stria 8.

Head transversely flattened between the eyes, shagreened, impunctate, with a round median fovea. *Rostrum* a little longer than its basal width, rapidly narrowed from base to scrobes, abruptly dilated at apex; the dorsal area concave, except near the base, deeper in front, with a feeble median carina in both sexes, the anterior transverse ridge angulated, the lateral margins with a single carina, diverging posteriorly; the lateral areas with a broad shallow sulcus reaching about half-way to the middle of the eye. *Antennae* with the scape stout, bearing stiff erect setae; funicle with the two basal joints equal, 7 equal to 6; club very long and narrow, especially in ♂. *Prothorax* feebly rounded laterally, widest at the middle, the postocular lobes strongly developed, with short vibrissae; dorsum with a shallow transverse impression near the apical margin, granulate in the middle of the disk, granulato-punctate laterally, with the usual two round postmedian impressions. *Scutellum* with fairly dense narrow pale scales. *Elytra* widening behind the middle in both sexes, with the shoulders obtusely projecting laterally, the apices obliquely truncate in ♀ and without any process; striae with deep round punctures, the intervals with sparse minute granules and the following tubercles: interval 1 with an elongate one at the top of the declivity; 3 with a large elongate one (the largest of all) near base, a small one at middle, and three or four behind this diminishing posteriorly; 5 with a small one before middle and two to five smaller behind it; tubercles all clothed with dense broad scale-like setae, the remaining setae narrower, recumbent and inconspicuous; the pale scales broadly ovate or almost round, the dark ones narrower.

Length 5·5–6·0 mm., breadth 2·5–3·0 mm.

Bombay Pres.: Bombay, 1 ♂, 1 ♀ (*Fontanier*).

A very distinct species on account of the tuberculate elytra; in addition to the characters given in the key, the rostrum is rather longer and more rapidly narrowed anteriorly than in the other species.

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41, Queen's Gate, S.W.7

1942.

WEDNESDAY, October 7
„ November 4
„ December 2

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